

## Ball and Sleeve Joint

### Patent Claims

1. A ball and sleeve joint for a motor vehicle, with a housing (1) and with a ball sleeve (5), which extends out of the housing (1) on both sides, has a through hole (8) and a bearing area (4) and is  
5 mounted with said bearing area (4) in the housing (1) such that two joint parts, which are rotatable and pivotable in relation to one another, are formed by the ball sleeve (5) and the housing (1),

#### **characterized in that**

a sensor (13), which interacts with a signal transmitter (2) arranged at the other joint part, is arranged at one of said joint parts, and

10 both said sensor (13) and said signal transmitter (2) are arranged between said through hole (8) and said housing (1).

2. A ball and sleeve joint in accordance with claim 1, characterized in that said sensor (13) is arranged in said ball sleeve (5) and said signal transmitter (2) in said housing (1).

3. A ball and sleeve joint in accordance with claim 1 or 2, characterized in that said sensor (13) is  
15 arranged in said bearing area (4) of said ball sleeve (5).

4. A ball and sleeve joint in accordance with one of the claims 1 through 3, characterized in that said signal transmitter (2) is a magnet and said sensor (13) is a magnetic field-sensitive sensor.

5. A ball and sleeve joint in accordance with claim 4, characterized in that said sensor (13) is a

magnetoresistive sensor.

6. A ball and sleeve joint in accordance with claim 4 or 5, characterized in that said signal transmitter (2) has an annular design.

5 7. A ball and sleeve joint in accordance with one of the claims 4 through 6, characterized in that a bearing shell (3) made of a nonmagnetic material is arranged between said signal transmitter (2) and said bearing area (4) of said ball sleeve (5).

8. A ball and sleeve joint in accordance with one of the claims 4 through 7, characterized in that said signal transmitter (2) is in contact with the inner wall of said housing (1), which consists of a ferromagnetic material.

10 9. A ball and sleeve joint in accordance with one of the above claims, characterized in that said ball sleeve (5) has an inner sleeve (6) and an outer sleeve (7) arranged concentrically therewith.

10. A ball and sleeve joint in accordance with claim 9, characterized in that said outer sleeve (7) is fixed at said inner sleeve (6) in a positive-locking manner in the axial direction.

15 11. A ball and sleeve joint in accordance with claim 9 or 10, characterized in that said inner sleeve (6) has a two-part design.

12. A ball and sleeve joint in accordance with one of the claims 9 through 11, characterized in that

a cavity (4a), in which said sensor (13) is arranged, is formed in said bearing area (4) of said ball sleeve (5) between said inner sleeve (6) and said outer sleeve (7).

13. A ball and sleeve joint in accordance with one of the claims 9 through 12, characterized in that said electric wires (14) connected to said sensor (13) are laid between said inner sleeve (6) and said  
5 outer sleeve (7).

14. A ball and sleeve joint in accordance with claim 13, characterized in that a axial groove (16), in which said electric wires (14) connected to said sensor (13) extend, is provided in the surface of the inner sleeve (6).

15. A ball and sleeve joint in accordance with claim 14, characterized in that said electric wires  
10 (14) are designed as said strip conductors of a printed circuit board (15) arranged in the axial groove (16).

16. A ball and sleeve joint in accordance with one of the claims 13 through 15, characterized in that said electric wires (14) are led out of the area between said inner sleeve (6) and said outer sleeve (7) in an end area (5a) of said ball sleeve (5).

15 17. A ball and sleeve joint in accordance with claim 16, characterized in that a second housing (18) for contacting said sensor (13) is arranged at said end area (5a) of said ball sleeve (5), in which said electric wires (14) are led out of said area between said inner sleeve (6) and said outer sleeve (7).

18. A ball and sleeve joint in accordance with one of the claims 9 through 17, characterized in that said outer sleeve is manufactured by a forming method without cutting.

19. A ball and sleeve joint in accordance with claim 18, characterized in that said outer sleeve is a hydroformed part.